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**Immediate Water Pollution Control Needs
Pecos River Basin, New Mexico and Texas**

Federal Water Pollution Control Administration, Dallas, Tex

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IMMEDIATE WATER POLLUTION CONTROL NEEDS

PECOS RIVER BASIN

NEW MEXICO AND TEXAS

U. S. DEPARTMENT OF THE INTERIOR
FEDERAL WATER POLLUTION CONTROL ADMINISTRATION
SOUTH CENTRAL REGION
DALLAS, TEXAS 75202

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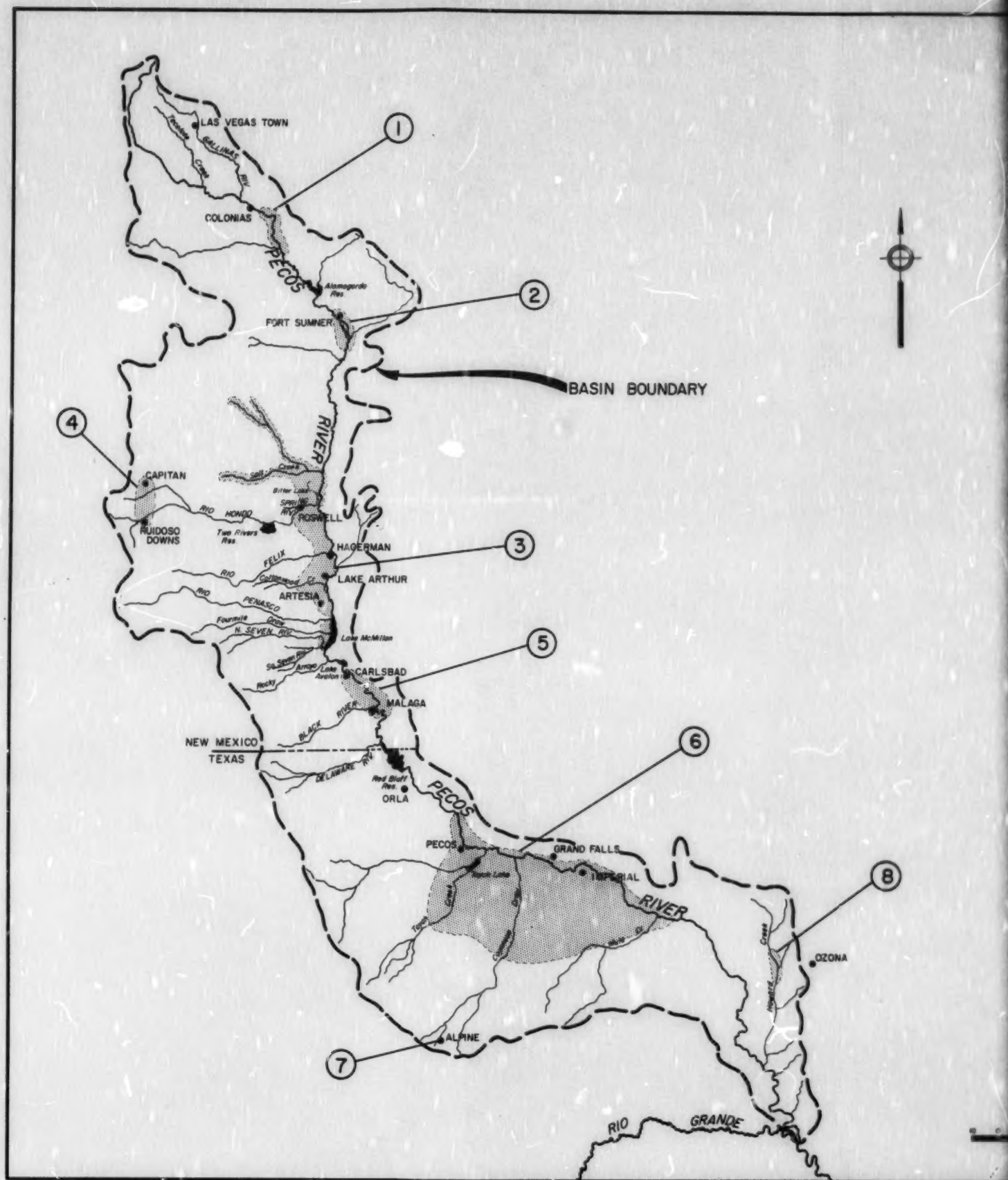
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I. Introduction

The purpose of this report is to focus attention on known sources of pollution and to provide a priority for action to correct the existing water pollution problems and prevent future problems in the Pecos River, (see figure 1), an interstate stream and its tributaries. This report is based on compilations of available data of the Federal Water Pollution Control Administration, South Central Region, and the pollution control agencies of New Mexico and Texas. No detailed water quality surveys or engineering studies were carried out for the preparation of this report.

The findings of this report are based on the best information available at this time on water quality conditions and immediate and potential pollution abatement needs. The omission of any particular town, industry, or other establishment from this report does not imply that an immediate or potential pollution abatement need may not exist in that particular area. Priorities listed are based solely on an evaluation of the Pecos River Basin and not on a relative basis with other basins in the South Central Region.

Authority is given in Section 3 (a) of the Federal Water Pollution Control Act, as amended, for the preparation or development of comprehensive programs for eliminating or reducing the pollution of interstate waters and tributaries thereof and improving the sanitary conditions of surface and underground waters. This report, by describing the immediate needs for controlling water pollution in the Pecos River Basin, represents the first step in the development of a comprehensive program to control water pollution in this basin.





DARY

LEGEND

② NEEDS



Scale in Miles
0 10 20 30 40

IMMEDIATE WATER POLLUTION CONTROL NEEDS
PECOS RIVER BASIN — NEW MEXICO AND TEXAS

LOCATION MAP

UNITED STATES DEPARTMENT OF THE INTERIOR
Federal Water Pollution Control Administration
SOUTH CENTRAL REGION APR 1967 DALLAS, TEXAS

FIGURE 1

II. Summary of Immediate Pollution Control Needs

Pollution problems in the Pecos River Basin, as indicated by septic conditions, high chloride concentrations, and oxygen depletion result in damages to propagation of fish life, agricultural, and recreation uses. The immediate pollution control needs are listed in the following tabulation. Location designations refer to figure 1.

<u>Location</u>	<u>Responsibility</u>	<u>Need</u>	<u>Priority</u>
<u>Waste Treatment</u>			
4	City of Ruidoso Downs, New Mexico	New collection system and lift station	B
	City of Capitan, New Mexico	Collection system; primary and secondary treatment	B
3	Glover Packing Co. Roswell, New Mexico	Additional treatment of feedlot and slaughter house wastes	A
	City of Artesia, New Mexico	Improved plant operation	B
7	City of Alpine, Texas	Secondary treatment	A
<u>Other Pollution Control Practices</u>			
1,3,6	Bureau of Reclamation, and States of New Mexico and Texas	Provide low-flow dams and off- channel evaporation ponds for mineral pollution control	A
6,8	Oil field Operators and Texas Railroad Commission	Reinject brine and improve disposal operations	A
5	City of Carlsbad, New Mexico	Irrigate with secondary treated effluent	A
3,5	Feedlot Operators	Construct feedlot waste control structures	B
2,3,5,6	States of New Mexico and Texas, irrigators	Retire certain irrigation lands and institute more efficient irrigation practices	A

<u>Location</u>	<u>Responsibility</u>	<u>Need</u>	<u>Priority</u>
<u>Institutional Practices</u>			
Basinwide	States of New Mexico and Texas	Prepare and adopt water quality standards	B
Basinwide	State of Texas	Consider legislation to provide appropriations for State participation in grants for construction of sewage treatment works	B
Basinwide	State of New Mexico	Provide increased appropriations for State grant program for construction of sewage treatment works	B
Basinwide	States of New Mexico and Texas	Expand water quality control surveillance program (including treatment plant operation and maintenance)	A
Basinwide	States of New Mexico and Texas	Prepare and maintain a complete industrial waste discharge inventory for industries not connected to municipal treatment systems	B
Basinwide	States of New Mexico and Texas	Establish legislation to control feedlot waste disposal	B
<u>Research</u>			
Basinwide	States of New Mexico and Texas, and Bureau of Reclamation	Investigate salt cedar control in Pecos River Basin	A
Basinwide	States of New Mexico and Texas, and FWPCA	Develop effective and economical method of treating feedlot wastes	B

III. Immediate Control Needs

Various measures are needed to control existing and potential water pollution in the Pecos River and its tributaries. These measures are needed to abate septic conditions, increase oxygen content, and reduce concentrations of chlorides for the protection of water uses within the basin. These uses include propagation of fish and wildlife, recreation, and irrigation.

The actions recommended here, though not all encompassing, are, however, prerequisite to good water quality planning and should be included in local, State, and Federal programming for water pollution control. Background for these immediate needs is summarized in Chapter VI.

Waste Treatment

Secondary treatment facilities are presently needed for the City of Alpine, Texas, to serve a design population of 10,000. Additional treatment of feedlot and slaughterhouse wastes from the Glover Packing Plant in Roswell, New Mexico, is also needed. Implementation of these projects should carry a high priority.

New or expanded treatment facilities or improved plant operation are needed by at least three other communities, Ruidoso Downs, Capitan, and Artesia, New Mexico, (as listed in the summary table). The list of needs is not considered all inclusive and does not reflect projected needs due to future obsolescence or to expanded or changed water uses.

Other Pollution Control Practices

The Bureau of Reclamation in cooperation with the states should construct low-flow dams and off-channel evaporation ponds to control mineral pollution from the several natural sources of mineral pollution in the basin.

Oil field operators and the Texas Railroad Commission should eliminate pollution from oil fields in Winkler and Ward Counties, (South Ward Field), and Crockett County.

The application to irrigation land of secondary treated waste from the City of Carlsbad, New Mexico, particularly during low-flow periods, would result in increased dissolved oxygen concentrations in the Pecos River.

Cattle feedlot operators should construct waste control structures to collect pollution-bearing runoff from feedlots near Roswell and Carlsbad, New Mexico, and Pecos, Texas, to abate surface and ground water

pollution.

Retirement of certain irrigation lands, some possibly to dry-land farming, and more efficient irrigation practices, e.g., crops requiring less water, cropping patterns, etc., would reduce the mineral concentration of the Pecos River (see figure 1).

Institutional Practices

To strengthen the States' position on prevention, control, and abatement of stream pollution, water quality standards are needed on interstate and intrastate streams. State participation is needed in Texas in the waste treatment plant construction grants program to accelerate the construction of needed improvements. The State of New Mexico needs to increase the appropriations for its present grant program for the construction of sewage treatment works. Increased surveillance and operation inspection of sewage and industrial waste treatment plants, by the States, are needed to locate and identify existing or potential serious pollution problems. For more rigid control over industrial pollution and aid in solving complex stream quality problems, a complete and up-to-date inventory is needed of industrial waste discharges to basin streams, listing quantity and quality of effluent and other pertinent data.

Legislation with enforcement provisions is needed in the States of Texas and New Mexico to establish control over waste disposal from cattle feedlots. The legislation should provide for a State administered program of permits, or licensing and inspection.

Research

Continued investigation and study by the Bureau of Reclamation and the States of New Mexico and Texas are needed to ascertain control measures for the problem of salt-cedar growth throughout the Pecos River Basin.

An expanded research program by Federal Water Pollution Control Administration and the States of New Mexico and Texas is needed to develop an economical and effective method for treatment of feedlot wastes.

IV. Costs

Estimates of the cost of waste abatement measures enumerated in this report indicate that about \$0.6 million must be invested in municipal and industrial treatment facilities. Of this total, \$0.5 million is needed for projects given a high priority.

In the absence of specific data, costs to control mineral pollution from natural sources and agricultural runoff were not determined.

V. Recent Progress in Pollution Control

Through the construction grants program, treatment facilities and appurtenant works have been constructed at the cities of Las Vegas City, Las Vegas Town, Roswell, and Hagerman, New Mexico, in the past several years.

The Malaga Bend Experimental Salinity Alleviation Project, constructed by the Bureau of Reclamation, was completed in 1963. Pumping operations lower the level of the brine aquifer which reduce the hydraulic gradient and thus the flow from the aquifer to the river. Brine pumped from this well is piped to 90 acres of lined evaporative tanks. Preliminary findings indicate chloride reduction in the order of 75 percent, from 260 tons per day to 70 tons per day. More water of suitable quality is available for irrigation use.

VI. Background

Pertinent Basin Characteristics

The Pecos River rises in north central New Mexico and flows generally southward for some 925 miles to its confluence with the Rio Grande. The Pecos River drains about 25,000 square miles in New Mexico, and 17,000 square miles in Texas.

Average annual precipitation varies from about 35 inches in the northern mountains to about 10 inches in the lower portion of the basin. Heavy winter snows in the mountainous areas provide water for irrigation as precipitation downstream usually occurs as brief but intense thundershowers. Except in limited areas at the higher elevations, precipitation is insufficient for successful crop production.

The annual rate of evaporation averages about 72 inches, although extremes range from less than 50 inches in the upper basin to around 100 inches in the lower basin.

Throughout the entire basin, population is concentrated along the main watercourses. Roswell, New Mexico, is the largest city with a 1960 population of nearly 40,000. Other important population centers are Las Vegas (14,000), Artesia (12,000), Carlsbad (25,000), New Mexico, and Pecos (13,000), Texas.

The principal industries in the basin in the order of their economic importance are oil and gas production, mercantile, agriculture, potash production, livestock, and manufacturing. The production of crude oil is the major industry in the basin. Carlsbad Caverns National Park, the most popular National Park in the United States, is located 28 miles southwest of Carlsbad, New Mexico.

There are four major reservoirs controlling the flow of the river: Alamogordo, Lake McMillan, Lake Avalon, and Red Bluff. Alamogordo (122,100 acre-feet), and Lake McMillan (33,600 acre-feet), are used for recreation and irrigation, Lake Avalon (5,000 acre-feet), functions principally in regulating irrigation diversions, and Red Bluff (310,000 acre-feet), is used for hydroelectric power generation and irrigation.

Water Quality

Poor quality water is a problem throughout much of the Pecos River Basin, particularly in the lower reaches. Through the process of dissolution both surface and ground water become contaminated with salt. In addition, return flows from irrigation concentrate salts in downstream progression.

During the period-of-record, October 1937 through September 1955, the concentration of dissolved solids in the Pecos River near Artesia, New Mexico (about 40 miles south of Roswell), varied from 479 mg/l to 14,000 mg/l, with a flow weighted mean value of 2,743 mg/l.

Extreme drought conditions have existed in the Pecos Valley since 1960, and the water of Red Bluff Reservoir has contained, on the average, more than 8,500 mg/l dissolved solids, 2,200 mg/l sulfate, and 3,200 mg/l chloride.

Salt Cedars

Phreatophytes (water-loving plants), primarily salt cedars, occur throughout the Pecos River Basin. They have created a serious channel-choking problem along the Pecos River and several tributaries. Also, the high consumption of the limited water supply by salt cedars has created serious water shortages for irrigation within the Pecos River Basin. A 1964 survey made by the Soil Conservation Service showed 201,300 acres of salt cedar infestation along the Pecos River with an attendant water wastage of more than 600,000 acre-feet annually. The Congress has authorized a salt cedar control and water salvage program in the Pecos River watershed in Texas and New Mexico. The Texas Water Development Board will participate with the Bureau of Reclamation and Pecos River Commission in implementing this project.

Present Water Quality Problems

Mineral

Mineral pollution from natural sources and irrigation is the principal water quality problem in the basin. Beginning near the headwaters of the basin, springs below Colonias, New Mexico, are estimated to contribute approximately 258,000 tons of dissolved solids annually to the Pecos River. Downstream, runoff from irrigated land in the Fort Sumner Project further increase the mineral concentrations in the river appreciably during low river flows. Near Roswell, high concentrations of chlorides from the Salt Creek and Bitter Creek areas enter the river.

Between Roswell and the State line, several sources of pollution contribute heavily to the mineral load of the river. Inflow in the Hagerman area contributes increased amounts of calcium, magnesium, and sulfate to the river water, while waters entering the river in the Lake Arthur area are high in chloride concentration.

Below McMillan Dam most of the springs flowing into the river are submerged and are difficult to sample. However, the springs that could be sampled were found to vary between 3,350 and 4,000 mg/l in concen-

tration of dissolved solids. Agricultural runoff occurs from approximately 130,000 acres of irrigated land between Roswell and Carlsbad, and 25,000 acres below Carlsbad. Finally, concentrated brine solution at Malaga Bend, New Mexico, just above the State line, increases the chloride content in the Pecos River by an estimated 70 tons per day.

The quality of the Pecos River water below Red Bluff Reservoir continues to be further deteriorated because of return flows from 237,000 acres of irrigated land and the highly saline inflow from ground water sources. Near Grandfalls, the concentration of dissolved minerals is nearly double the concentration of Red Bluff Reservoir outflow. The major portion of the increase in salinity occurs between Pecos and Grandfalls.

Pollution from these sources restrict propagation of fish and wildlife and irrigation use of the waters of the Pecos River.

Municipal and Industrial

Waste discharges from Carlsbad, New Mexico, and Alpine, Texas, cause oxygen depletion and septic conditions which restrict, to a small degree, recreational use and propagation of fish and wildlife in the receiving streams.

Feedlot and slaughterhouse wastes from the Glover Packing Plant in Roswell, New Mexico, cause algae "bloom" and oxygen depletion in Spring River, a tributary to the Pecos. This pollution is hazardous to aquatic life and public health. The State of New Mexico has recently filed suit against this firm, requiring additional treatment facilities.

Oil Field

Instances of ground and surface water contamination have been investigated in Winkler and Ward Counties (South Ward Field), Texas, (near the city of Pecos), and a detailed study of Crockett County, Texas (in which the city of Ozona is located), revealed many instances of contamination resulting from oil field brine disposal operations. Water from the brine-polluted streams is used for irrigation and propagation of fish and wildlife.

Feedlots

There are feedlots in the Pecos River Basin with feeding capacities of about 150,000. As of January 1, 1967, these lots were feeding about 80,000 head of cattle. The heaviest concentration of these feedlots is in the Roswell, New Mexico area, where about 75 percent of all the cattle feeding in the basin occurs. Other important cattle feeding

areas include the Carlsbad, New Mexico, area and the Pecos, Texas, area. Organic matter in runoff from these lots causes oxygen depletion, algae growth, and nitrate buildup in the receiving streams which can affect public health, fish and wildlife propagation, and recreation.

Fish kills

Several scattered fish kills have been reported in the Pecos River Basin over the past several years, as shown in Table 1. No kills were reported in New Mexico.

Table 1

<u>Stream</u>	<u>Location (Nearest City)</u>	<u>Date</u>	<u>Operations Responsible for Kill</u>	<u>Severity</u>
Pecos Ri.	Imperial	6-66	Transportation operations - pipeline	Moderate
Red Bluff Reservoir	Orla	4-66	Unknown	Light
Pecos Ri.	Grandfalls	5-64	Industrial operations - petroleum	Heavy
Pecos Ri.	Ozona	9-64	Industrial operations - petroleum	Moderate
Pecos Ri.	Sheffield	5-62	Other	Heavy

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